

Case Report

Spinal cord herniation after brachial plexus injury

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Abstract

Background: Spinal cord herniation (SCH) is an uncommon cause of myelopathy. Documented trauma is a rare cause, and most cases are idiopathic. One special type of trauma that may lead to SCH is a brachial plexus injury. We report a case of SCH with delayed neurological symptoms after a brachial plexus injury. We reviewed the literature and illustrated the closing technique as described by Batzdorf.

Case Description: Following a motor vehicle accident, a 27-year-old male sustained a brachial plexus injury and multiple left-sided nerve root avulsions (C6, C7, and C8) resulting into a full paralysis of the left arm. There was also a loss of pain and temperature sensation on the right side of the body. He underwent reconstructive surgery without any functional improvement. After 6 to 7 years his condition worsened. Magnetic resonance imaging revealed a left-sided SCH at the level of C7. He underwent a C6-C7 laminectomy which revealed a pseudomeningocele at C6-C7 accompanied by focal SCH at the location of the C7 root. The SCH was reduced intradurally and the dural defect of the meningocele was covered with a Neuropatch membrane wrapped around the spinal cord (between the spinal cord and the dura) according to the technique described by Batzdorf. Postoperatively, the neurological symptoms improved.

Conclusion: SCH should be surgically repaired utilizing the technique described by Batzdorf if further neurological deficits develop.

Key Words: Batzdorf surgical repair, myelopathy, spinal cord herniation

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Quick Response Code:**INTRODUCTION**

Spinal cord herniation (SCH) is a rare cause of myelopathy. The diagnosis and treatment can be challenging, and most patients have a delay in diagnosis as the progression of symptoms is often insidious. Etiologies of SCH rarely include trauma as most are idiopathic. We report a case in which a patient sustained delayed onset of a progressive myelopathy attributed to a SCH occurring years after a brachial plexus injury involving avulsion of the C6, C7, C8 nerve roots. Here, we reviewed the literature and utilized the closure technique described by Batzdorf.

CASE REPORT**History**

A 27-year-old male was involved in a traffic accident that resulted in a left-sided brachial plexus injury

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resulting in avulsion of the C6, C7, and C8 nerve roots. He sustained a full paralysis of the left arm accompanied by a loss of pain and temperature sensation on the right side of the body. He underwent reconstructive surgery without any functional improvement. After 6 to 7 years he developed progressive worsening myelopathy (e.g., increased stiffness/gait difficulty, atrophy) in the left leg.

Neurological examination revealed a complete, paralysis of the C6-, C7- and C8-innervated muscle groups of the left arm with areflexia and sensory loss. In the left leg, there was new atrophy of the quadriceps and gastrocnemius muscle with hyperreflexia and a diffuse mild paresis with a foot drop. There was additional sensory loss on the right side of the body starting at the T4-dermatome. The gait was spastic on the left side.

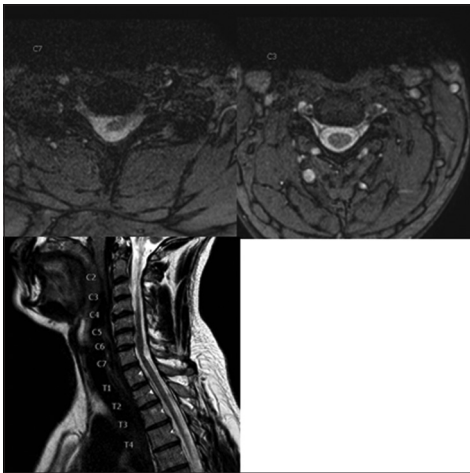


Figure 1: Axial T2-weighted images. Right image showing normal position of the cervical cord at level C3. Left image at level C7 showing left-sided cord herniation: anterior and left-sided displacement of the cord towards the foramen of root C8 resulting in the stretching and flattening of the cord. Sagittal T2-weighted left-sided off midline image. Anterior displacement of the cord against the posterior aspect of level C4 to C6 and posterior indentation on/anterior angulation of the cord on level C7

T2-weighted magnetic resonance imaging (MRI) (1.5 T) revealed left-sided SCH at the C7 root level; this was characterized by anterior left-sided displacement of the spinal cord towards the C8 root foramen with stretching and flattening of the cord [Figure 1]. MR myelography demonstrated left-sided displacement of the spinal cord due to SCH as well as a prominent myelocoele at level C6-C7, the site of the prior traumatic root avulsion [Figure 2].

Operation

The patient underwent a C6-C7 laminectomy which revealed a pseudomeningocele at the C6-C7 on the left side. Upon opening the dura in the midline, the spinal cord was covered with a thickened arachnoid. It was herniated into the pseudomeningocele at the C7 root level and there were accompanying adhesions. The herniated spinal cord was reduced intradurally [Figure 3], and was covered with a Neuropatch membrane wrapped around the spinal cord (between the spinal

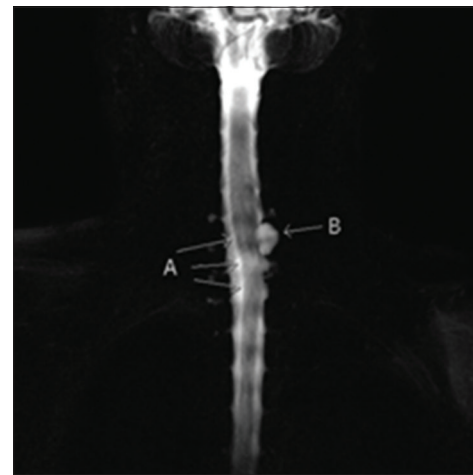


Figure 2: Coronal T2 myelography. Left-sided displacement of the cervical cord (arrows A) due to cord herniation. Note the prominent myelocoele (B) at level C6-C7 on the left after prior traumatic root avulsion

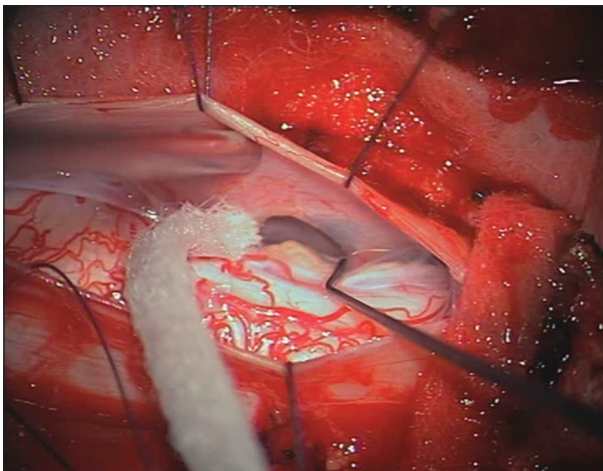


Figure 3: Intraoperative image of the SCH and the dural defect

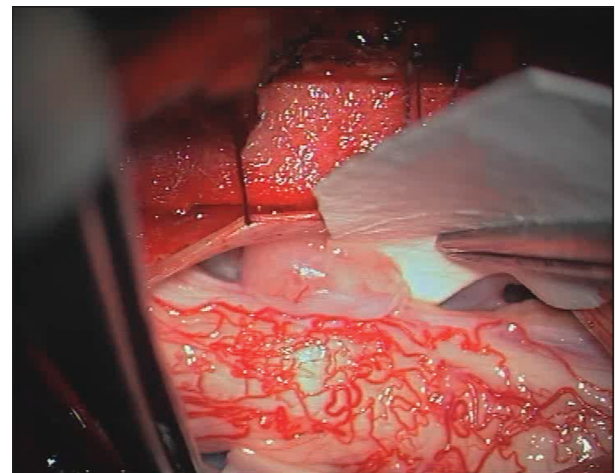


Figure 4: Intraoperative image of the Batzdorf repair of the SCH using an artificial membrane

cord and the dura, e.g. according to the Batzdorf technique) [Figures 4-9]. The dura was then closed using 4-0 monofilament sutures.

Postoperative course

The postoperative course was uneventful and the neurological symptoms improved clearly; there was an increase in strength in the left leg and he was able to walk more normally at 6 and 12 weeks of follow-up.

DISCUSSION

Spinal trauma can cause a dural tear and persistent dural rent with a ruptured arachnoid leading to extravasation of cerebrospinal fluid creating a pseudomeningocele.^[1-6] A pseudomeningocele occurs in up to 29% of cases after brachial plexus injury.^[1-6]

A long period is needed for a pseudomeningocele to become symptomatic. If a pseudomeningocele extends along the spinal canal causing compression or adhesions

onto the spinal cord, delayed neurological symptoms may occur. In this case, increased myelopathy was noted along with greater corticospinal and spinothalamic tract resulting in an ipsilateral motor deficit and a contralateral sensory loss for pain and temperature [Figures 5-9].^[1-6]

Only a few cases of SCH after a brachial plexus avulsion injury which resulted in a herniation of the spinal cord into a pseudomeningocele have been reported. In those cases, myelopathy showed an early improvement after reduction of the SCH, with dural repair.^[1-6]

CONCLUSION

SCH should be surgically repaired utilizing the technique described by Batzdorf [Figures 5-9] if further neurological deficits develop.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient has given her consent for her images and other clinical information to be

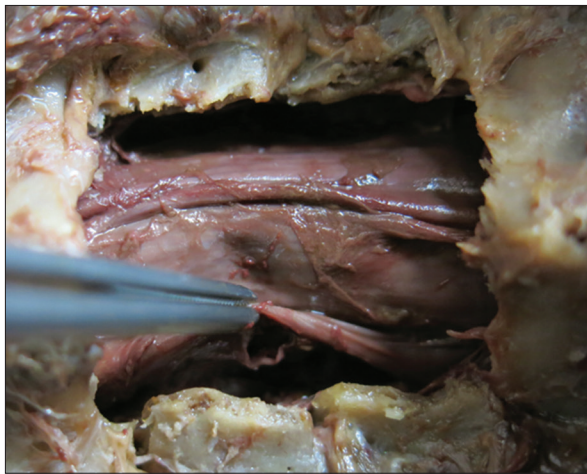


Figure 5: Cadaver image of a C6-C7 laminectomy with creation of an artificial root avulsion

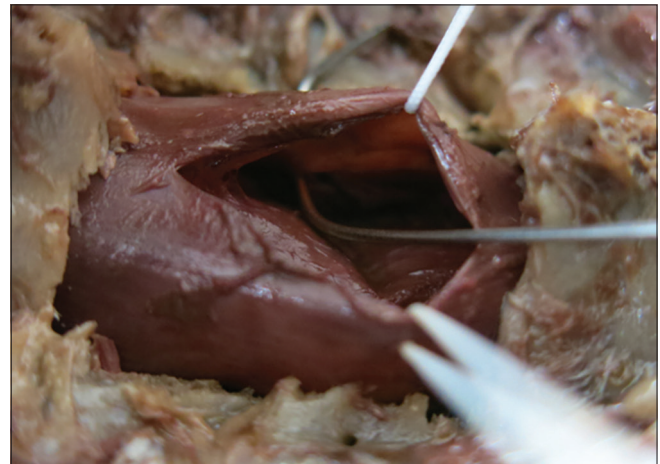


Figure 6: Intradural cadaver image demonstrating the root avulsion with the dural defect

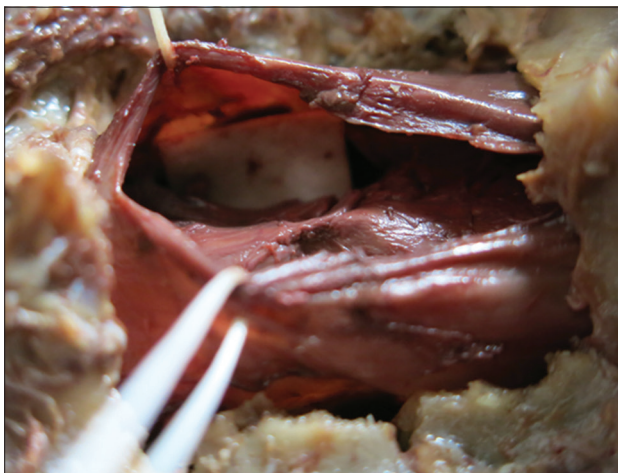


Figure 7: Cadaver image of the wrapping of the dural defect at the nerve root avulsion using an artificial membrane

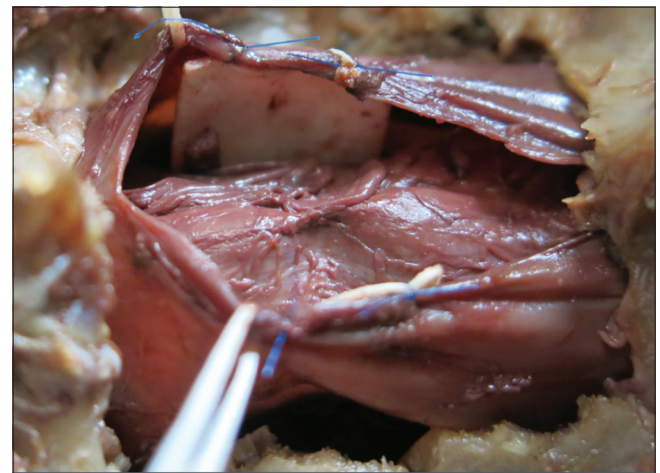


Figure 8: Cadaver image of the fixation of the artificial membrane. Note that for demonstrative purpose the dural defect is still shown

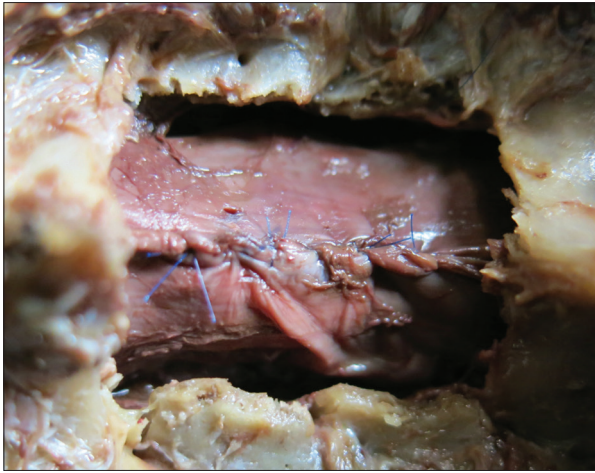


Figure 9: Cadaver image of the dural closure with the artificial membrane subdural between the spinal cord and the dura

reported in the journal. The patient understands that name and initial will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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